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(54) Browning composition

(57) A browning composition for food having a dough crust comprising a caramel colour and a thickening agent, which undergoes browning reactions upon microwave or conventional heating.

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Description**FIELD OF THE INVENTION**

This invention relates to a browning composition for foods having a dough crust. More particularly, the invention relates to a coating composition for foods having a pastry crust which undergoes browning reactions upon microwave or conventional heating to provide cooked products having a desirable browned crust.

BACKGROUND OF THE INVENTION

The usage of microwave ovens in homes has increased significantly in recent years and continues to increase. While microwave cooking of foods affords a significant time saving over conventional convection oven cooking, it suffers from the disadvantage that foods cooked by microwave energy lack the desired degree of surface browning that foods, particularly those having a dough crust such as meat pies and fruit pies, have when cooked in a conventional oven.

The most common reaction responsible for surface browning during cooking of products having a dough crust is the well-known Maillard reaction (non enzymatic browning) between naturally occurring reducing sugars and compounds containing an amino group, e.g. amino acids, peptides and proteins, which results in the formation of colored melanoidins. The rate at which the Maillard reaction proceeds to form the colored pigments increases markedly with temperature. When foods containing a dough crust, such as frozen pies, are heated in a conventional oven, the crust is heated to considerably higher temperatures than the interior of the pie, with the high surface temperatures being sufficient to achieve browning. However, in microwave heating the heat energy is released internally within the food so that the surface remains at a relatively even temperature with the interior. Consequently the high surface temperatures necessary to achieve browning are not reached within the time required to bake the pie.

A number of compositions have been proposed heretofore to create a browned surface on foods heated by microwave energy. However, none of these prior compositions has been entirely satisfactory due to flavor concerns, cost, ineffectiveness, difficulty of use, and other problems.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a browning composition comprising a caramel colour and a thickening agent.

DETAILED DESCRIPTION OF THE INVENTION

The pH of the browning composition is preferably less than 7 e.g. from 3 to 5.

The caramel colour may be ordinary caramel colour

or it may advantageously be a caramel colour replacement. Examples of caramel colour replacements are brown compounds which, based on limited solubility in both organic and aqueous solvents, appear to be classical melanoidines of unknown structure having an average molecular weight range of from 1 to 10 kDaL. The melanoidines may be prepared by reacting a reducing sugar with a compound containing free amino groups such as an amino acid, peptide or protein. The sugar may be a currently available raw material such as glucose, fructose, galactose, lactose, dextrose (e.g. from corn syrup) or maltose. The compound containing free amino groups may be, for instance, ammonia, a hydrolysed plant protein, a yeast derivative such as a yeast autolysate or yeast extract, an oil cake of peanut or soya, gluten, casein or proteins of microorganisms.

The thickening agent may be for example a modified starch, a polysaccharide or a hydrocolloid gum such as carrageenan, locust bean, alginate or guar gum. Preferably, the thickening agent is also a stabiliser for storage at low pH, especially storage in a freezer and improves the freeze-thaw stability. The thickening agent helps to retain the browning composition on the surface of the dough crust when applied.

The ratio of caramel colour to the thickening agent may be from 5:100 to 100:100 and preferably from 10:100 to 50:100 by weight.

The browning composition may be used in the form of an aqueous emulsion or as a dry powder e.g. formed by spray drying or freeze-drying the emulsion.

When the browning composition is used in the form of an aqueous emulsion, the amount of caramel colour is conveniently from 1 to 25%, preferably from 2.5 to 20% and especially from 5 to 15% by weight based on the total weight of the browning emulsion. The amount of water in the emulsion may be from 50 to 90% by weight based on the total weight of the browning composition.

Advantageously an edible oil is present in the browning composition to aid heat transfer. Examples of oils are corn oil, soy oil, safflower oil, cottonseed oil and sunflower oil. The amount of oil present in the composition is advantageously 5 to 50 times the amount of caramel colour. An emulsion of the browning agent may contain from 5 to 50% by weight of edible oil based on the total weight of the emulsion. The presence of an edible oil may provide enhanced browning of the dough crust on microwave heating.

Other ingredients which may be present in the composition include food grade acids to provide acidity and give a longer shelf life, sugared egg yolk, a flavour such as paprika, or hydrolysed plant proteins.

The present invention also provides a process for treating a food product having a dough crust to render the crust brownable upon heating in a conventional or microwave oven which comprises applying to the surface of the dough crust an amount of a browning composition comprising a caramel colour and a thickening agent effective to develop a browned surface on the

crust when heated in a conventional or microwave oven.

The browning composition can be conveniently coated, such as by brushing, spraying, and the like onto the surface of a previously formed dough crust of a food to be baked, such as a meat pie or fruit pie. Satisfactory results are obtained when the composition is coated onto the surface of the dough crust in an amount of about 0.008 to 0.02 gm/sq. cm. The crust may be formed of any of the well known dough materials conventionally used in the preparation of crusts for frozen pies, such as flour, water, fat or shortening, as well as conventional additives for modifying flavour and/or texture. The coating composition may be applied to the dough crust at the time the pie is prepared after which the resulting product is frozen and maintained in a frozen state until baking. Alternatively, the coating composition may be applied to the dough surface after the pie has been frozen.

The food product having the dough crust which has been coated with the composition of this invention may be baked in a microwave oven utilizing conventional time-temperature relationships which will vary depending on the nature and size of the product. During microwave heating, the surface of the dough crust undergoes a browning reaction to provide a baked crust having a desirable golden brown appearance substantially the same as that obtained by baking the food product in a conventional convection oven.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following Examples further illustrate the present invention. Parts are given by weight.

Examples 1 to 3

The ingredients listed in the following Table I were blended well by shear mixing to make a good emulsion of a browning agent having a pH of 4.3.

TABLE 1

Ingredients	Ex.1	Ex.2	Ex.3
Water	550	550	550
Soy oil	250	250	250
Sugared egg yolk	10	10	10
Acetic acid	0,86	0,86	0,86
Modified starch*	23	23	23
Caramel colour	6,25	9,0	10,4
Aqua Resin Paprika	0,6	0,6	0,73

*Mira Thik 468, Staley

5 2 g of each emulsion were sprayed onto frozen 300 g chicken pies the crusts of which developed an attractive brown colour when heated in either a microwave or a conventional oven. Frozen chicken pies coated with the browning agent had a good shelf life.

Examples 4 to 6

10 The procedures of Examples 1 to 3 were repeated but using instead of the caramel colour, a caramel colour replacement having the constitution shown in the following Table 2:

15 TABLE II

Ingredients	Parts
Glucose	10
Protein	10
NH ₄ Cl	5,5
NaCl	2,5
Melanoidine*	30
Water	to 100

20 *A compound formed by the reaction of glucose and ammonia having a molecular weight distribution of 2-5kDa (~5%) and 1-2kDa (~5%) based on gel filtration chromatography.

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30 2 g of each emulsion were brushed onto frozen 300 g chicken pies. Some chicken pies were heated in a conventional oven at 205°C for 35 minutes and the 35 crusts developed a very attractive golden brown colour. The remainder of the chicken pies were heated at high power in a 700 watt microwave oven for 10 minutes whereupon the crusts developed a very attractive golden brown colour even stronger than that of the crusts of the chicken pies heated in a conventional oven.

Claims

40 50 1. A browning composition comprising a caramel colour and a thickening agent.

2. A browning composition according to claim 1 whose pH is less than 7.

45 55 3. A browning composition according to claim 1 wherein the caramel colour is provided by melanoidine.

4. A browning composition according to claim 1 wherein the thickening agent is a modified starch.
5. A browning composition according to claim 1 wherein the thickening agent is also a stabiliser for storage at low pH. 5
6. A browning composition according to claim 1 wherein the ratio of caramel colour to the thickening agent is from 10:100 to 100:100. 10
7. A browning composition according to claim 1 which is in the form of an aqueous emulsion.
8. A browning composition according to claim 7 15 wherein the amount of caramel colour is from 1 to 25% by weight based on the total weight of the emulsion.
9. A browning composition according to claim 1 20 wherein an edible oil is present.
10. A browning composition according to claim 9 wherein the amount of edible oil is from 5 to 50 times the amount of caramel colour. 25
11. A browning composition according to claim 1 wherein a hydrolysed plant protein is present.
12. A process for treating a food product having a 30 dough crust to render the crust brownable upon heating in a conventional or microwave oven which comprises applying to the surface of the dough crust an amount of a browning composition comprising a caramel colour and a thickening agent effective to develop a browned surface on the crust when heated in a conventional or microwave oven. 35
13. A process according to claim 12 wherein the browning composition is applied onto the surface of the dough crust in an amount of from 0.008 to 0.02 g/ 40 sq.cm.

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EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.)	
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	A21D13/00	
X	WO-A-92 07477 (PFIZER INC.) * page 3, line 4 - line 7 * * page 5, line 23 - line 31; claims; examples 1,10 * ---	1,3,4, 6-12	A21D13/00	
X	EP-A-0 542 510 (UNILEVER PLC) * column 2, line 30 - column 3, line 26 * ---	1,3,4		
X	EP-A-0 284 186 (DALGETY U.K. LIMITED) * page 1, line 20 - page 3, line 46 * ---	1-8,11, 12		
X	GB-A-2 228 662 (CONTINENTAL BAKING COMPANY) * page 6, last paragraph - page 9, last paragraph *	1,6-9,12		
A	EP-A-0 481 249 (SOCIETE DES PRODUITS NESTLE S.A.) * examples *	1,7-13	TECHNICAL FIELDS SEARCHED (Int.Cl.)	
A	WO-A-90 12506 (THE PILLSBURY COMPANY) -----		A21D A23L	
The present search report has been drawn up for all claims				
Place of search	Date of completion of the search	Examiner		
THE HAGUE	21 March 1996	Bevan, S		
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document		
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document				

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